GENERAL HEADQUARTERS
UNITED STATES ARMY FORCES, PACIFIC
OFFICE OF THE CHIEF SURGEON

CIRCULAR LETTER NO. 38

APO 500
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WHOLE BLOOD

1. Proved group "O" unpooled, whole blood is now being supplied to the Pacific from the United States. It is delivered via the U. S. Navy Whole Blood Distribution Center No. 1 at Guam to Manila, Leyte and Okinawa. Each hospital should obtain blood from the distribution center in the immediate vicinity. The centers at Manila and Leyte are designated as U. S. Army Whole Blood Distribution Centers No. 1 and No. 2 respectively. The center at Okinawa is the U. S. Navy Whole Blood Distribution Center No. 2.

2. Blood is delivered in insulated plywood boxes containing 16 pints of blood or in insulated aluminum foil covered cardboard boxes containing 24 pints. Each of these boxes is adequately iced to maintain a temperature of approximately 40° - 42° Farenheit for twenty-four hours. When properly refrigerated this blood may be utilizable for thirty days after collection.

3. Each bottle of blood contains 480 cc of whole blood and 120 cc of acid-citrate-dextrose solution as the anticoagulant and preservative. An expendible, sterile, pyrogen-free injection set is furnished for each pint of blood. These sets are made with a glass connector and housing, in which there is a monel metal, 100 mesh filter, to which is attached a length of rubber tubing, luer-tip glass adapter and 18 guage needle. There is also an airway cannula which provides a patent outlet for the airway tube in the bottle. This set should be used only once and discarded.

4. Group "O" blood may be given safely to recipients of any group. Routine cross-matching is not essential. To insure proper preservation blood must be maintained at 40° - 42° Farenheit throughout its storage period. Blood may be injected safely without warming it, but if the surgeon prefers to raise the temperature of the blood it should be done by allowing the bottle to stand at room temperature for 30 minutes and not by placing it in hot water. Prior to use, the bottle should be shaken or oscillated for 5 minutes in order to assure complete mixture and to break up fibrin clots that may be present. When the injection set is connected to the bottle, the glass filter chamber and tube should be completely filled with blood before the vein is entered. The chamber can be filled by holding the bottle in the inverted position and producing a trip hammer motion similar to shaking down a thermometer. It is frequently necessary to administer blood rapidly, especially in patients who have received injury to large arteries and have bled pro-

fusely. In these cases blood may be injected in two or more veins simultaneously. Flow may be increased by inserting a needle connected to a 30 cc syringe into the rubber tube of the injection set. The tube is clamped off below the syringe, the syringe is filled with blood, the clamp is then placed on the tube above the syringe and the blood forced into the vein with the plunger of the syringe. This is repeated as long as necessary. In this manner eight or ten pints of blood can be given in one hour. In a patient with a marked reduction in circulating blood volume, this may be a life saving procedure.

5. Prior to this war blood transfusions were normally employed in limited quantities and occasionally as a terminal form of therapy. Experience during this war in all theatres has indicated the need for the transfusion of casualties early and with large amounts of blood. There is no fixed amount of blood required in a particular type of casualty, but in shock resulting from moderately severe hemorrhage, three to four pints may be required to prepare the patient for surgery, two to three pints during the operation and additional quantities afterwards. Blood pressure readings, hematocrit determinations and clinical appearance serve as the best criteria to determine the amount of blood needed. Shock due to hemorrhage results in a decreased hematocrit. Although total circulating blood volume cannot be deduced from hematocrit readings, the initial hematocrit reading made when the patient arrives in the shock ward provides an estimate of the blood lost. Hematocrit readings of 25 - 30% indicate that the patient has lost approximately one-third of his blood volume. To prepare the patient for surgery it is seldom necessary to replace the entire loss. Blood is given until the systolic blood pressure is 100 or above and the extremities are warm. The first pint or two may be given rapidly (5-8 minutes), followed by others at a slower rate. When the patient is awaiting surgery, however, he should be resuscitated as quickly as possible. When the patient has received three to four pints of blood rapidly and the blood pressure has failed to recover normally, this is suggestive evidence of continuing hemorrhage or rapidly spreading infection, calling for prompt surgical intervention. In these cases surgery should be combined with repeated transfusions. In thoracic injury combined with massive hemothorax, transfusion should be given continuously until relatively normal cardio-respiratory physiology can be restored by aspiration. Patients with respiratory embarrassment tolerate poorly a sudden increase in circulating blood volume.

6. Plasma will continue to be used when blood is not available and to supplement transfusions. Plasma has its greated usefulness in the battalion aid station and in the field where blood cannot be made accesible. The use of plasma here provides adequate support for the patient to be transported to an installation where surgery and resuscitation with whole blood can be combined. In cases of shock from burns or other causes not produced by severe whole blood loss, plasma can be used very effectively.

7. It is not expected that all bottles of blood received from the United States will be fit for use. There are three common causes for rejection: excessive hemolysis, contamination and breakage. Excessive hemolysis may be due to abnormal fragility of red blood corpuscles, exposure to excessive heat or cold and contamination. Blood that shows only slight evidence of hemolysis in the supernatant plasma usually is safe to use as the faint reddish color is due primarily to suspended red blood cells in the plasma. Blood that is markedly hemolyzed as shown by the supernatant plasma having a deep reddish tinge, should be rejected and discarded. Contamination of blood at the time of collection is extremely rare, but when it occurs, the blood usually becomes hemolyzed and the turbidity of the plasma increases. Bottles of blood that have an abnormal color, evidenced both in the red cell layer and in the plasma, should be discarded as unfit for use. Contamination by gas forming organisms, with increase of pressure in the bottle, may occur. This becomes evident when the airway needle is inserted into the airway tube for blood will be forced out under pressure through the airway needle. Also a foul odor is usually detectable. In this event the bottles should be discarded. The most common cause for modification of blood prior to use is exposure to excessive heat or cold or variations in temperature. Blood will hemolyze when exposed to excessive heat and is irreparably damaged when frozen. Refrigerators, used for storing blood, should be operated at 40° - 42° F. When blood is stored below this temperature, fibrin precipitates, thus increasing the mechanical difficulties of passing it through the filter provided.

8. A monthly transfusion report will be prepared by each hospital and submitted to the U. S. Army Whole Blood Distribution Center from which the blood is received. The form for this report is inclosed.

Paul F Robinson
Colonel, Medical Corps
for and in the absence of
GUY B. DENIT
Brigadier General, U. S. Army
Chief Surgeon.

Incl: Report form.

DISTRIBUTION: O (MD)

REPORT ON THE USE OF
WHOLE BLOOD

Name of Hospital _____ date _____

1. Amount of blood on hand at beginning of month..... pints

2. Amount used..... pints

3. Amount discarded because of:

    a. Contamination..... pints

    b. Breakage..... pints

    c. Hemolysis..... pints

4. Amount on hand at end of month..... pints

5. Reactions:

    a. Urticarial

    b. Pyrogenic

    c. Incompatibility

    d. Anuria

Incl 1.